Ayre Acoustics

C-5xe Universal Player

Ayre Acoustics is the product of just one man's vision, and if his products are any example, it's pretty obvious that Charlie Hansen's vision is 20/20. He's also a man of considerable convictions, such as '*fully balanced circuitry performs best*', '*only zero feedback circuitry delivers completely natural performance*' and the necessity of conventional linear power supplies with multistage filtering. Not surprisingly, he's incorporated all these concepts—and more—into a product that to my knowledge is unique in two ways. First, although the C-5xe is a 'universal' player that will play back CDs, SACDs and DVD-As, it has only two-channels, so when you're playing multi-channel SACDs and DVD-As, you will be hearing the two-channel downmix. Second, you don't need to connect a video monitor to do any disc navigation when playing back DVD-As. You can instead navigate entirely with the C-5xe itself.

The Equipment

When I lifted the C-5xe out of its carton, out dropped a manual for the K-5x preamplifier and this, combined with the weight of the wrapped component, made me think that local distributor Advance Audio must have sent the wrong demonstrator by mistake. But when I removed the wrapping to reveal the C-5xe, I realised partly why, at 12kg, it was so heavy. The build quality is massive. Likewise when I looked inside, the power supply would put quite a few amplifiers to shame, with its two huge Mercury Magnetics transformers. One of these powers the transport (which is made by Pioneer) and decoder, via eight discrete regulators. The other powers the Burr-Brown DSD1792 DAC, the Sony CXD2753 DAC and the associated audio circuits, via no fewer than fourteen discrete regulators. As for that missing manual, it was as close as Ayre's excellent website.

The physical appearance of the C-5xe appears to be a 'Boulder, Colorado' thing, because that's where Ayre is located, and where it builds its equipment. But the 'look' is very similar to that of Boulder amplifiers, which also hail from Boulder, Colorado. Despite this, I am reliably informed that the only thing the two companies have in common is a suburb. The C-5xe looks beautiful. The front panel lines are superclean and attractive whilst also being distinctly 'different' from the usual run-of-the-mill. As for that control knob… it's actually two controls: a central circular 'rocker' switch surrounded by a concentric 'joystick' ring, with both recessed into a cut-out with curiously rounded edges. The outer ring has the 'Play' control at the top, 'Next' (and 'Forward Scan') at the 3'o'clock position, 'Tray Open/Close' at 6-o'clock and 'Back' (and 'Reverse Scan') at the 9-o'clock position. The inner toggle switch has just two actions: 'Pause' at the top, and 'Stop' at the bottom. When playing DVD-Video discs (only the audio component is available, of course!), pressing 'Stop' initiates the usual DVD 'Resume' mode, so you can take up where you left off any time you like just by pressing 'Play' again, or clear the memory by pressing 'Stop.'

Ayre's remote control at first seemed downright weird, sporting icons I'd never seen before, complete with multi-coloured LEDs (red, green and orange). The icon that looked like stars falling from the sky turned out to be the 'Random Play' button and the one containing the symbol that looked like a fish activated the remote control handset's in-built illumination, which lights LEDs built into the Stop, Pause, Play and Track Skip buttons. The remote has a particularly useful feature we've never seen before (and one that has 'Charlie Hansen' written all over it!) whereby if a button is pressed for much longer than expected (such as might happen if the remote is placed upside down, or slips down the back of a couch cushion) the microprocessor inside will automatically disconnect the batteries so they won't go flat in the interim. My only possible complaint about the remote is that it's not overly elegant, though this is only particularly noticeable when you compare it to the C-5xe itself.

The back panel of the C-5xe is far busier than most. First and most obviously, there is the choice between balanced and unbalanced analogue audio outputs. The primary advantage of balanced circuitry is that it inherently rejects noise and interference, though this is usually only useful when you're running low-level signals over long distances… though it can be useful in eliminating mains hum if you run a signal cable close to a 240V power cable—either one attached to a component, or one hidden inside a wall. Connectors are

standard, with Ayre using XLR connectors for balanced output and gold-plated RCA for unbalanced. However, Ayre also uses an XLR connector for its digital output. Although this is quite standard on professional audio equipment, it's rare on consumer equipment, so if you want to use the digital output, you will need to invest in the requisite adaptor (XLR to RCA or XLR to BNC). A small DIP switch alongside the XLR digital output lets you switch the output off if it's not required. A second switch immediately alongside labelled 44/48kHz ensures discs recorded at higher sampling rates will be downsampled to either 44.1kHz or 48kHz. Setting the switch to its other position (88/96kHz) will allow high-sample-rate discs to output directly, but will downsample 176.4 or 192kHz discs to 88.2kHz or 96kHz.

Further along on the rear panel is a four-pole DIP switch, though only two of the four switches are used. One switch selects between two different algorithms programmed into the Ayre C-5xe's digital output filter. The one labelled 'DF Listen' (the 'DF' standing for Digital Filter) uses the algorithm whose time domain accuracy is better than its accuracy in the frequency domain. The other 'DF Measure' has a more accurate frequency response, but a less accurate time response. The other switch selects whether the C-5xe responds to remote commands from the infra-red remote control (IR Receiver) or to remote commands input via the six-pin control port on the rear panel. This allows you to control the C-5xe from a Crestron or AMX controller. Unlike most such ports, the Ayre's port is decoupled using opto-isolators, so no noise can creep in. Also unlike many companies, Ayre provides Crestron (and Pronto) command files on request—and promptly!

In Use & Performance

When it actually came to setting up and using the C-5xe, I experienced quite a few little hiccups. The first and most easily fixable of these is simply that the DIP switches are recessed too deeply inside the casing to make them easily accessible. My problem was that I was having to switch them back and forth relatively often as a part of the necessarily-intensive review process. Ayre would no doubt argue that since for most users setting the DIP switches will be a 'set once and then forget' operation, it's a safer option to make them less accessible. A second problem turned out to be down to me not taking the time to read the manual, because I complained that the sample-rate switch on my sample was intermittent and therefore possibly faulty. It turned out that the unit has to be switched on, but without a disc playing, before the switch will work as designed, otherwise there's a 'state mismatch' that disables the digital output entirely and requires a complete power-down/power-up to reset. My next hiccup came when it came to navigating DVD-A menus using the C-5xe's front panel display. In theory, it's quite simple: all you have to do is load a DVD-A, then press use the 'Previous' and 'Next' controls on the outer ring to play each group in turn, and when you get to the one that has the highest sampling rate, play that one (and, while you're at it, make a Texta note of it on the DVD-A cover!). However, if a disc has two different groups recorded at the same sampling rate, there is really no way to tell which is which without leaping on the Internet or firing the disc up and working out which sounds the best. Also, once you have started playing a group, you can't just switch to the other: you have to stop play then skip. And, if you accidentally skip forward a group, you can't change your mind and skip backwards, you first have to press 'Stop' then skip backwards. Like I said, it's fiddly. Luckily, working out the correct group will be a 'one-time only' process, after which you'll be able to use your 'Texta-ed' note on the back of the DVD cover to go to the correct group instantly. CDs and SACDs play perfectly except that you can't program CDs to play back in a specific order and you can't use the 'Random' play mode when playing back SACDs. For the record only, it also is not easy to navigate through discs filled with MP3 files because the Ayre can navigate through folders only in set order, and you can only switch from one folder to another when you're actually playing (or are paused) in the first or last track in a folder. Was I worried about this? Not particularly, because my view is that anyone found guilty of using an Ayre C-5xe to play MP3s should be taken out at dawn and summarily executed.

> "when SACD is good, it is very, very good, and when you hear it played back on a player such as the Ayre C-X5e, it's exquisite."

You realise that all the trouble of marking your DVD-As with Texta has been worth it when you finally get around to playing them through the C-5xe. Once you have heard the sound through the Ayre, you will never go back to listening through your DVD player, even though this means foregoing the visual

- Superb build
- Switchable filters
- Great sound

- Fiddly operation
- MP3 navigation
- CD/SACD volume

Ayre Acoustics C-5xe Universal Player

Brand: Ayre Acoustics
Model: C-5xe
Category: Universal Player
RRP: $13,000
Distributor: Advance Audio Pty Ltd
Address: Unit 8, 509–529 Parramatta Road
Leichhardt
NSW 2040
T: (02) 9560 4855
F: (02) 9569 1085
E: sales@advanceaudio.com.au
W: www.advanceaudio.com.au

image. Live concert performances through the Ayre just sound gutsier, with seemingly higher levels of energy coursing through the musicians and the complete effect is really far more like being at the original concert, even minus the visuals. What was also clearly apparent was the added level of detailing from the C-5xe that meant that whereas I'd previously blamed the 'live mix' for the lack of fine detail, with the result that the sounds seemed to blend together, the Ayre immediately revealed that the fault was with the previous players I'd been using, because with the C-5xe, there was detail aplenty, so that when listening to a guitar duel, what was previously an amorphous sound, where it was impossible to tell one guitarist from the other, I found that the C-5xe not only accentuated the minor tonal differences, but also clearly delineated the tiny differences in timing. Magic! What a difference the C-5xe made to one of my favourites, the Musicare Person of the Year Tribute to James Taylor, featuring Bonnie Rait, The Dixy Chicks, Jackson Browne, Sting, and Carole King (of course!) amongst others. This had good sound to begin with (even the 5.1 mix) but the C-X5xe turns up the crispness of the vocals to an unprecedented level of intelligibility. This is a great disc, one of the best ever. When played another DVD-A favourite of mine, Donald Fagan's 'Kamakiriad', the Ayre display indicated that the group that's supposed to be two-channel 96kHz was actually just Dolby Digital, so either I was sold a pup, or some flag hasn't been set. This was one complication I did not get to the bottom of.

One of the SACDs I most loved playing over and over again on the Ayre was the Martha Argerich/Dora Schwartzberg recording on Avanti, which features Franck's Violin/Piano Sonata in A major; Debussy's Violin/Piano Sonata in G minor, and Robert Schumann's Fantasy Pieces (Avanti SACD 5414706 10232). I just had to buy this disc, despite its miserly playing time (under 60 minutes) and I was glad I did, because Argerich really plays her heart out on this one, Just listen to the power she generates with her left hand on crescendos! However, this disc also highlights her delicacy as well, so that she almost has only to imply a note, rather than play it, to deliver the effect. This type of detail just isn't revealed when playing ordinary CDs. Unfortunately, because SACDs are to all intents and purposes 'unobtainium' down here in Australia, one's only recourse is the Internet, which has the disadvantage that you can't listen before buying, with the result that I now own some very ordinary (and very expensive) SACDs. But when SACD is good, it is very, very good, and when you hear it played back on a player such as the Ayre C-X5e, it's exquisite.

The reality is, however, that with rare exceptions, if you want to enjoy good performances, rather than just good sound, we're going to be stuck with listening to good ol' CDs for quite a while yet, so it's crucial that any 'universal' player—no matter how well it plays back DVD-As and SACDs—should not short-change the Red Book format. I was rather stunned to hear that not only did the C-X5e play back every CD I loaded with much higher fidelity than any other universal player I have ever used (including a certain high-priced Scottish import), it played back them back with the same high level of resolution and—I almost hate to write the word—'musicality' as even the best CD players this side of five figures. My favourite version of Bach's English Suites is the one Murray Perahia recorded for Sony back in 1998. Producer Andreas Neobronner and recording engineer Johannes Müller lavished an enormous amount of care on this, using the beautiful acoustic of the *Theatre La Salle de Musique* in Switzerland, sourcing a Model D-274 Steinway from Italy, and using Super-Bit-Mapping for the recording. It seems even Perahia's playing was inspired for the occasion, because it's even better than his usual high standard. The result is that the performance is absolutely superb. The depth of the sound, the precision of the attacks, the sustain of the decays, and the beautiful balance of the direct piano sound with the 'fill' from the acoustic means this is a disc to treasure (Sony SK60277). Pay particular attention to the way Perahia plays the *Allemande* of Suite No 2 in A Minor (BWV807)—his *legato* is breathtaking and the way he threads the left- and right-hand parts together without losing either is truly genius. If you already have other versions of these Bach masterpieces, you'll need this one anyway. If you don't, this is the one to get. Even if you don't think you're 'into' classical music—much less solo piano music—you might be surprised at how modern almost all the tracks sound: Suite II's *Gigue* could easily be a modern pop song. A word of warning if you're trying to use the C-5xe to compare a CD version with an SACD version: you can't—or at least you can't do so easily. The reason is that due to the way the C-5xe processes the two signals, the SACD output level is far lower than it is for CD (and DVD-A). This means that unless you adjust for equal output, the CD version will always sound better simply by virtue of being louder. (It's a well-known psychoacoustic phenomenon that when the ear is presented with two sounds that are in all ways identical except for their volume level, the ear will always 'prefer' the quality of the louder sound.) This also causes a minor issue during playback, which is that if, like most audiophiles, you have a preferred 'sweetest' playback level, you'll now likely need three crayon marks on your volume control: one for LP, one for CD and one for SACD.

Conclusion

One thing I might not have made clear is that I am very probably the last person in the world to review Ayre's C-5xe—it debuted more than three years ago in the US at CES. But this is just one more of Ayre's many strengths: Hansen designs his equipment for the long haul, choosing only internal components that will go the distance, for which he's certain he can provide support, and once he's designed a component, it stays fixed in the Ayre line-up: there's no 'flavour of the month' marketing up there in Boulder, Colorado. As he once told Stereophile's Wes Phillips: "*We want the gear to make beautiful music that is compelling and captivating, and we want the stuff to boogie and be maintenance-free—and we want to do all that at a fair price.*"

Ayre's C-5ex isn't just a brilliant 'universal' player, it's a brilliant CD player in its own right. *Chris Croft*

LAB REPORT

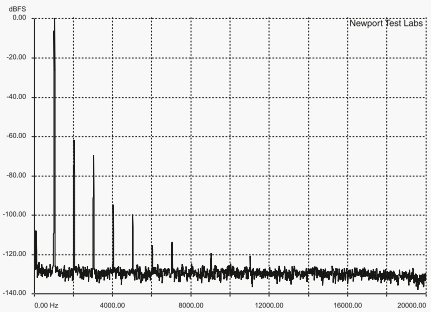
Readers interested in a full technical appraisal of the performance of the Ayre Acoustics C-5ex should continue on and read the LABORATORY REPORT published on the following pages. Readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphs and/or photographs should be construed as applying only to the specific sample tested.

Test Results

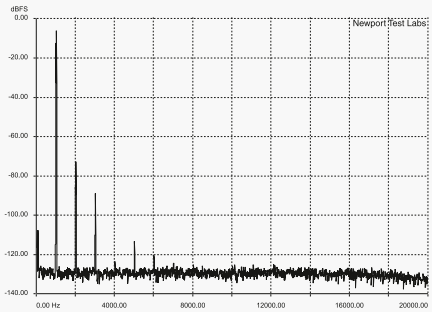
First, readers should note that all the tests on the Ayre Acoustics C-5xe were conducted using an ordinary CD: the standard Philips CD Test Disc (Audio Signals Disc 1). This is for the simple reason that at the time of writing, there was no accepted standard test disc for measuring SACD players. Sony has apparently released a 'provisional' test disc, but despite repeated attempts to obtain one, *Newport Test Labs* has so far been unsuccessful in doing so. One has to wonder about Sony's commitment to the SACD format if it can't make these available for sale, even on limited basis.

The frequency response of the Ayre Acoustics C-5xe varied depending on the setting of the rear-panel switch. In *Graph 12* it was set to 'listen' with the result that the response was 3dB down at 20kHz. Setting it to 'measure' allowed the response (not shown) to extend to 20kHz with a drop of only 0.6dB. Such high-frequency variations will be audible, of course, but equally important is the response below 10kHz, and here the Ayre C-5xe was absolutely flat, no matter what the setting of the rear panel switch. And when I say 'absolutely', I mean I don't think I've ever seen a flatter, more linear response. Equally incredible was channel separation, as shown in the tabulated figures. *Newport Test Labs* measured separation as better than 140dB below 1kHz, and at 20kHz it was still 124dB. The 140dB figures are so low they couldn't be properly graphed, and instead had to be extricated from below the noise floor by FFT.

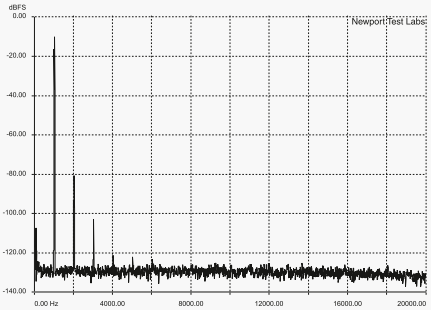
The harmonic distortion of the Ayre Acoustics C-5xe, as measured by *Newport Test Labs* using the 'Listen' mode, was quite a bit higher than I expect to see from a CD player, but this was mostly evident at very high recorded levels, which only ever occur on test CDs, because commercially recorded CDs must be recorded at much lower levels for reasons of ensuring sufficient headroom. *Graph 1* shows the output spectrum with a 1kHz signal at 0dB, which is an absolute 'worst-case' scenario and you can see there are prominent harmonics at 2kHz (–60dB) and 3kHz (–70dB). The other harmonics visible (extending from the fourth to the 11th) are all more than 90dB down—indeed all except the 4th are more than 100dB down—and so contribute less than 0.001% to total THD, so are insignificant. Even the highest harmonic, at 60dB, is equivalent to just 0.1% THD, which is approximately what I'd expect from a well-recorded LP. That some of this distortion is in the output stage is evidenced by *Graph 2*, which shows output at –6dB, which is still a far higher level than you'll find on commercial CDs. You can see that the higher-order components have all but vanished,



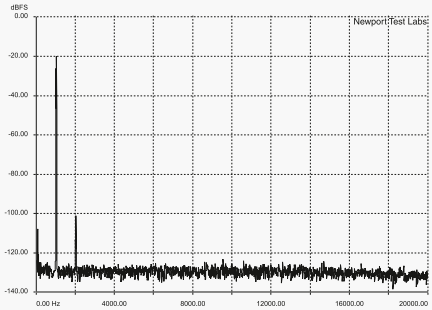
Graph 1. THD @ 1kHz @ 0dB recorded level. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



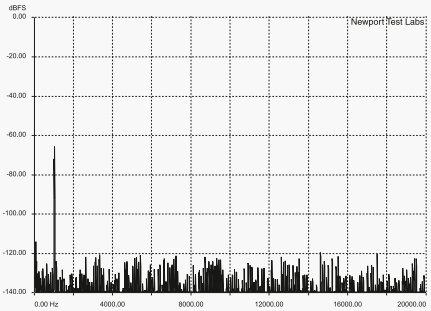
Graph 2. THD @ 1kHz @ -6dB recorded level. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



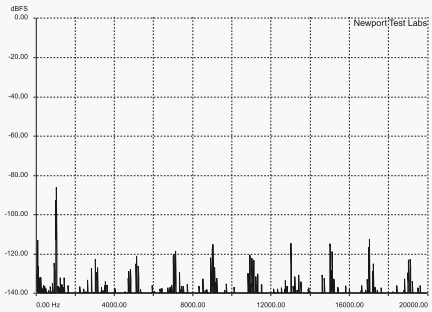
Graph 3. THD @ 1kHz @ -10dB recorded level. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



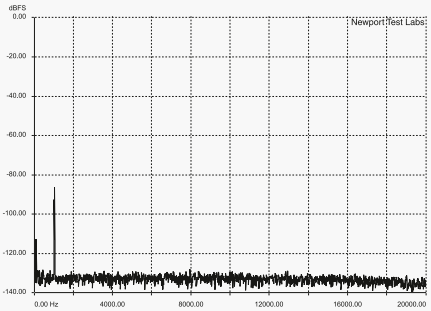
Graph 4. THD @ 1kHz @ -20dB recorded level. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



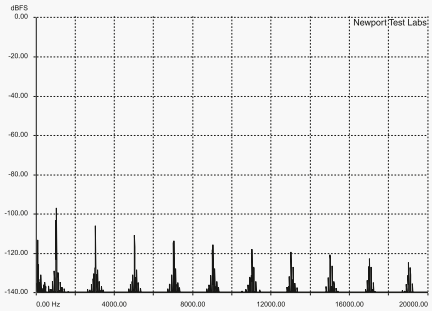
Graph 5. THD @ 1kHz @ -60dB recorded level. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



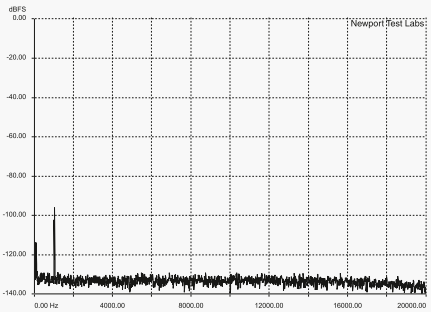
Graph 6. THD @ 1kHz @ -80.59dB recorded level. (Dithered) (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



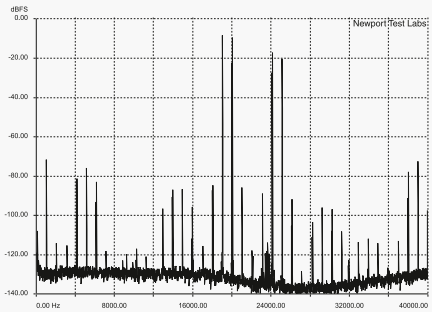
Graph 7. THD @ 1kHz @ -80.70dB recorded level. (Undithered) (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



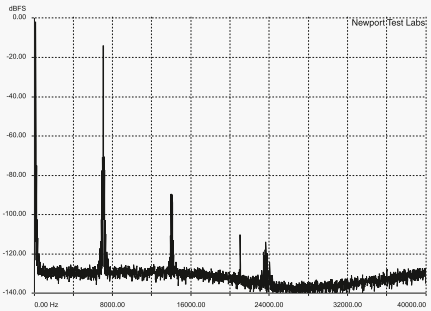
Graph 8. THD @ 1kHz @ -91.24dB recorded level. (Dithered) (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



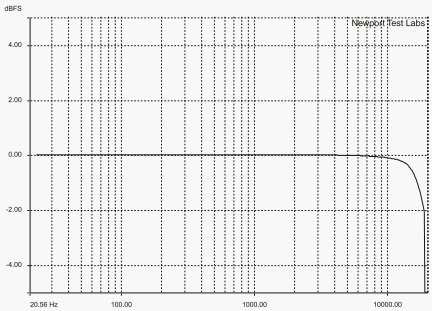
Graph 9. THD @ 1kHz @ -90.31dB recorded level. (Undithered) (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



Graph 10. CCIF Distortion (Twin-Tone Intermodulation) @ 1kHz @ 0dB using 19kHz and 20kHz test signals in 1:1 ratio. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



Graph 11. SMPTE Distortion (Intermodulation) @ 1kHz @ 0dB using 60Hz and 7kHz test signals in 4:1 ratio. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]



Graph 12. Frequency Response at @ 0dB recorded level. (CD Test Disc) [Ayre Acoustics C-5 Universal Player]

and the levels of the 2nd and 3rd harmonics have dropped to –72dB (0.02%) and –88dB (0.003%) respectively. At –10dB recorded level (*Graph 3*), which is about on the mark for the maximum level on a commercial CD, the 2nd harmonic is sitting at –81dB (0.008) and the third is below –100dB. At –20dB (*Graph 4*), even the second harmonic is more than 100dB down. Incidentally, using the 'Measure' mode improves these figures marginally, but it was by such a small amount that I doubt it would be audible, so we've decided to publish the 'worst-case' ('Listen') results for all graphs.

At extremely low recorded levels, the difference in the Ayre Acoustics C-5xe's output was marked, depending on whether or not the test signal was dithered. Since all commercial CDs are dithered, it's the dithered graphs to which you should refer, which are *Graph 6* and *Graph 9*. You can see that at the left of the graph is the spike that is the test signal itself (sitting at –80.59dB in *Graph 6* and at –91.24dB in *Graph 9*) but to the right all you can see is the noise floor, at around –135dB. Not a distortion component in sight. That's excellent performance that would only improve with higher-res DVD-A and SACD discs. What these undithered signals do indicate, however—though somewhat obliquely—is that the Ayre C-5xe is the first 'universal' player I've seen that is obviously capable of delivering sub-–140dB noise floors with SACD and DVD-A.

Since I've managed to get onto levels, the level accuracy (linearity) of the Ayre C-5xe's output was remarkable, recording at best result of just 0.01dB error at –90.31dB and a 'worst' of just 0.09dB at –89.46dB. Once you factor in the inevitable margin for measurement error, you get an inkling of just how superb these results are. The de-emphasis figures were also outstanding: these are listed in the tabulated results.

The graph showing CCIF distortion looks to be scattered with signal components, but bear in mind that the bottom of the graph is –140dB, so the greater majority of them fall below –90dB, or 0.003%, and only one or two peek above –80dB (0.01%). One of those that does is the 1kHz regenerated signal, which is sitting at around –72dB (0.02%). However, I also suspect that *Newport Test Labs* didn't use a low-pass filter, which means that the high-frequency sampling components in the Ayre's (unfiltered) output very likely confused the A-D converters in the test equipment. [*Editor's Note: When I double-checked, it transpired that Steve was right, but it's me that has to take the blame, since I commissioned only a 'standard' CD report from Newport Test Labs. All future tests of high-res players will show results with the required AES filter in circuit. G.B.*)

The digital performance of the Ayre Acoustics C-5xe was quite simply the best I've seen from any disc player. Audioband jitter was just 0.7nS peak-to-peak and data jitter just 0.8nS p–p. Deviation was almost non-existent… and just look at those eye-narrowing pattern results, particularly zero cross, so if you want to feed the output into an outboard DAC—though given the Ayre's own performance, I can't see why you would!—you'll be giving it a superbly accurate signal.

Ayre Acoustics' C-5xe has been superbly—and rather cleverly!—designed. My opinion is that it could not fail to please even the most discerning listener, irrespective of which medium it's playing back: CD, SACD or DVD-A. *Steve Holding*

Ayre Acoustics C-5 SACD (Universal) Player Test Results (CD Playback Only)

Analogue Section	Result	Units/Comment
Output Voltage	2.0614/2.0092	volts (Left/Right)
Frequency Response:	+0.0/–3.0	dB (20Hz–20kHz)
Channel Separation:	140/141/124dB	16Hz/1kHz/20kHz
THD:	0.06%	@ 1kHz @ 0dBFS
Channel Balance:	0.22dB	@ 1kHz @ 0dBFS
Channel Phase:	0.02/0.00/6.00	16Hz/1kHz/20kHz (degrees)
Group Delay	–5.90/+5.90	degrees (1k–20k/20k–1k)
S/N Ratio (No Pre/emphasis)	80dB/94dB	dB (unweighted/weighted)
S/N Ratio (Pre-Emphasis)	80dB/94dB	dB (unweighted/weighted)
De-Emphasis Error	0.01/0.02/0.76dB	(1kHz/4kHz/16kHz)
Linearity Error @ –60.00dB/–70.00dB	0.03/0.04	dB (Not Dithered)
Linearity Error @ –80.59dB/–85.24dB	0.02/0.08	dB (Not Dithered)
Linearity Error @ –89.46dB/–91.24dB	0.09/0.06	dB (Not Dithered)
Linearity Error @ –80.70dB/–90.31dB	0.02/0.01	dB (Dithered)
Power Consumption	13/23 watts	Standby/On
Mains Voltage During Test	239–251 volts	Min–Max
Digital Section	**Result**	**Units/Comment**
Digital Carrier Amplitude	73mV	Audioband
	1.03V/48mV	Differential/Common Mode
Audioband Jitter	0.7/0.004	nS (p–p) / UI (p–p)
Data Jitter	0.8/0.005	nS (p–p) / UI (p–p)
Deviation	+5.0	ppm
Frame Rate	44100.224	
Eye-Narrowing (Zero Cross)	0.8/0.005	nS (p–p) / UI (p–p)
Eye-Narrowing (200mV)	3.7/0.022	nS (p–p) / UI (p–p)
Absolute Phase	Normal	Normal/Inverted
Bit Activity	23	At Digital Output